



# **Home Bias on Portuguese PPR Pension Funds**

*by*

Ana Carla Alves Lopes

Email: 201006112@fep.up.pt

**Dissertation for the Master in Finance**

*Supervisor:*

Júlio Fernando Seara Sequeira da Mota Lobão

**Year of Graduation: 2015**

## **AUTHOR`S BIOGRAPHY**

Ana Carla Alves Lopes was born on January 24, 1992 in Porto, Portugal. Prior to pursuing Master`s program in Finance at School of Economics and Management, University of Porto, Portugal, since September 2013, she obtained a Bachelor degree in Management in the same University. Towards the end of her first year as a Master`s degree candidate, she did a summer internship at Accenture and followed it by accepting a full time position as a junior assistant within Global Markets Operation department at BNP PARIBAS, Lisbon. In February 2014, she also joined a project with the CIB Innovation team at the same company.

## ACKNOWLEDGEMENTS

The completion of this dissertation ends an important chapter of my academic path. However, I would not be able to accomplish it without the input and contribution of several people to whom I would like to express some words of gratitude.

I would like to express my deepest gratitude and appreciation to my supervisor, Professor Júlio Lobão. Initially, for his help and enthusiasm in defining the object of study and, foremost, for the vital support, recommendations and guidance to enhance the dissertation.

I would like to thank all colleagues of my team in BNP PARIBAS, for sharing their experience, their valuable insights and constant support, namely Hugo Araújo, Rúben Almeida, Ana Maria Silva, Francisco Cardoso, Leandro Dionisio, Segno Alessou, Sophie Assoa, Camille Benard, Maximilien Brett and my manager Alice Polat.

I wish to express my deepest acknowledge to my parents, my sister and all my family for their unconditional support and encouragement throughout this lengthy period. I would like to thank my cousin Natália Marcos, Eurico Marcos and their little baby Leonor for all the support that they have given me since I moved to Lisbon. I also would like to thank my uncles “from the heart”, Maria do Ceu and Marcial for all the support that they give during this time and for always being there when I am in need. I also cannot forget to mention David Casimiro and thank him for the advices that he gave me when writing this thesis.

I would like to thank all my friends from Porto for their constant support, namely my childhood friends and my friends from VAI group, namely Marinho and Goreti. Thank you all my friendly classmates from FEP, namely Pratik who came to Lisbon several times last year and always visited me and also to Luna for all the support. I also would like to thank all my housemates in my first house; where I lived during the first 10 months in Lisbon, for all the dinners and party that we shared together. Special thanks are also to my boyfriend for his daily support, patience and love.

## ABSTRACT

Despite the fact that investments in foreign assets make portfolios more diversified and offer returns at a lower risk, the degree of diversification in international assets remains low according to French and Poterba (1991). It has been argued that the Home Bias and familiarity with domestic market conditions make investors invest a majority of their wealth in domestic assets rather than foreign ones, leading to a suboptimal portfolio diversification. Pension Funds, over the past decade have grown sharply both in terms of volume and value, making it an important asset class to be studied for the impact of Home Bias on the fund diversification. Using a panel data of Portuguese Pension Funds, we studied the impact of Home Bias in portfolio holdings of Portuguese Institutional Investors on different asset classes, including bonds and equities. Empirical results suggest that Home Bias does affect Portuguese investors in charge of Portuguese PPR (Plano Poupança Reforma) pension funds. Also, the fund's relative size does not indicate a larger foreign asset proportion in the portfolio. Our findings show that matured fund investors are less prone to be affected by Home Bias; however, this does not seem to be the case if bonds and equity assets are singled out. Cover Ratio has been found to have an effect on Bonds with higher ratio, signaling less bias.

**Keywords:** Pension Funds, Portfolio Choice, Home Bias

**JEL-Codes:** G11, G23

## RESUMO

Com mais investimentos em ativos estrangeiros conseguimos obter um *portfolio* mais diversificado, com uma taxa de retorno que oferece menor risco, contudo, o grau de diversificação dos ativos internacionais permanecem baixos de acordo com French and Poterba (1991). Tem sido argumentado que os investidores sofrem de *Home Bias* e que a sua familiaridade com o mercado interno leva a que estes invistam uma parte importante da sua riqueza em ativos domésticos e menos em ativos estrangeiros, o que torna o valor da diversificação do *portfolio* abaixo do ideal. Os Fundos de Pensões, ao longo da última década tem crescido muito rapidamente, tanto em termos de volume como também de valor, tornando-se desta forma uma importante classe de ativos a ser estudada para averiguar o *Home Bias*. Usamos um painel de dados de Fundos Portugueses de Pensões dos Planos Poupança Reforma (PPR) para diferentes classes de ativos, nomeadamente obrigações e ações. Os resultados empíricos sugerem que o *Home Bias* afeta os investidores portugueses na gestão dos fundos de pensões Portugueses. Descobrimos que o tamanho relativo do fundo não sugere um aumento da proporção de ativos estrangeiros em carteira. Os nossos resultados confirmam também que os investidores de fundos amadurecidos são menos propensos a serem afectados pelo *Home Bias*, no entanto, isso não é verificado se analisarmos separadamente as ações e obrigações. O rácio de cobertura é apenas verificado nas obrigações. Rácios de cobertura maior sinalizam menos propensão a *Home Bias*.

**Keywords:** Fundo de Pensões, Carteira de Escolha, *Home Bias*

**JEL-Codes:** G11, G23

# TABLE OF CONTENTS

AUTHOR`S BIOGRAPHY .....	i
ACKNOWLEDGEMENTS .....	ii
ABSTRACT.....	iii
RESUMO .....	iv
INDEX OF FIGURES.....	vi
INDEX OF TABLES .....	vii
1. INTRODUCTION .....	1
2. DESCRIPTION OF PENSION FUNDS MANAGEMENT ACTIVITY IN PORTUGAL .....	4
2.1. Pension Funds in Portugal.....	4
2.1.1. Importance and Latest Trends .....	4
2.1.2. Evolution .....	7
2.2. Portuguese Funds comparison with other countries.....	9
3. LITERATURE REVIEW .....	11
3.1. Equity Home Bias .....	11
3.2. Empirical Evidence .....	12
3.3.1. Institutional Explanations .....	14
3.3.2. Behavioural Explanations.....	16
4. DATA AND METHODOLOGY.....	19
4.1. Data .....	19
4.2. Home Bias across market and asset classes .....	20
4.3. Methodology .....	23
4.3.1. Hypothesis and Model.....	23
5. EMPIRICAL RESULTS .....	27
6. CONCLUSIONS AND SUGGESTIONS .....	34
6.1. Summary of Findings .....	34
6.2. Main contributions .....	35
6.3. Limitations and suggestions for further research .....	36
BIBLIOGRAPHY .....	37

## INDEX OF FIGURES

Figure 1: Projections of Resident People in Portugal in 2010 and 2060 .....	5
Figure 2: Evolution of Pension Funds in Portugal.....	7
Figure 3: Assets of Pension Funds by associated companies in 2014 .....	8
Figure 4: Importance of pension funds relative to the size of the economy in the OCDE .....	9
Figure 5: Progression of domestic and foreign yearly average percentage holdings of all asset classes.....	20
Figure 6: Evolution of yearly average percentage holdings of equities across markets .....	21
Figure 7: Evolution of yearly average percentage holdings of bonds across markets .....	22

## INDEX OF TABLES

Table 1 – Structure of Pension Funds in 2013 .....	6
Table 2 – Descriptive Variables from 2006 until 2014 .....	27
Table 3 – Correlation matrix for the variables that were analyzed in our regressions from 2006 until 2014 .....	28
Table 4 – Regression analysis of the Home Bias in Portuguese PF`s asset allocation from 2006 until 2014 .....	29
Table 5 – Regression analysis of the Home Bias in Portuguese PF`s Equity holdings .....	30
Table 6 – Regression analysis of the Home Bias in Portuguese PF`s Bond holdings .....	31



# 1. INTRODUCTION

The advent of the 21<sup>st</sup> century saw countries across the globe removing trade barriers, which in turn made international financial markets more integrated with each other. This invariably brought with it an increase in opportunities for investors to invest in foreign assets. This offered diversification to their portfolios with higher returns at a given level of risk when compared to internationally non-diversified portfolios (Grubel (1968); Eldor *et al.* (1988); Solnick (1995)). Using a mean-variance optimization in combination with a capital asset pricing model (CAPM), Black and Litterman (1992) concluded that for a given level of risk, international diversification boosts portfolio performance.

It is expected that Institutional Investors are better positioned to have a well internationally diversified portfolio compared to individual investors. Institutional Investors such as Pension Funds (PF) are well positioned to enjoy the superior investment performance in terms of risk and return through internationally diversified investments. However, it seems that they do not totally exploit these opportunities and hold low proportions of foreign assets in their portfolios (Davis *et al.* (2002)). This propensity of institutions or individual investors to make financial investments in their home country rather than in foreign markets is usually defined as “Home Bias”.

The evidence of Home Bias (HB) still prevails in equity holdings of European individual investors (Mann *et al.* (2002)). This bias strongly influences investors’ investment decisions even when greater diversification outside their domestic market could yield greater profits at lower risks. The existence of the bias is a well-documented phenomenon within international equity portfolio (e.g., Tesar and Werner (1995) and; Cooper and Kaplanis (1994)). Several authors try to find possible explanations for the persistence of the Home Bias. For instance, Errunza and Losq (1985) pointed out to international diversification barriers; Cooper and Kaplanis (1994) posited departures from purchasing power parity as the underlying cause while, Stockman and Dellas (1989), Baxter and Jermann (1997) and Wheatley (2001) have highlighted hedging of human capital and other non-tradable assets as the underlying reasons.

The integration of financial markets and the introduction of common currency across European Union member states led to the increasing Institutional investors holdings across European asset class. Portugal was no exception and as of 2014, Portuguese Pension funds held assets worth an amount of € 16,718.4 million, which accounts for almost 10% of the country's Gross Domestic Product (GDP). In this thesis we intend to analyze the degree to which Home bias affected Portuguese Institutional investors by investigating the degree of international diversification of Portuguese PPR Pension Funds.

We have used portfolio and balance sheet information of 14 Portuguese PPR PFs over the eight years period between - (2006-2014) - to study the presence of home bias in the asset distribution of these funds, and we have analyzed a plausible relationship between Portuguese PPR PFs' individuality characteristics and their asset allocation transversely across markets, in this particular case, bonds and assets. In our panel data analysis we have made use of descriptive analysis to measure the existence and dynamics of Home Bias in Portuguese PPR PFs, while co-variance between their asset distribution and individual characteristics are considered using regression analysis. This approach can provide a valuable insight on the overall results analysis therefore the fund's characteristics age, size and cover ratio were added to the study. The incorporation of these variables improves the quality and robustness of our findings and differentiates this study from the previous literature.

The main motivation for this topic is that we have found a gap while we were considering Home Bias topic. The relationship of funds 'characteristics and the Home Bias is a framework rarely studied by the existing literature. Besides that, most of the studies written on this topic were US based. In Europe a limited number of studies on this topic were found. Therefore, it was important to have this first study applied for the Portuguese market, in which we provide empirical study explaining home bias by using multi-assets data. Institutional investors, namely mutual funds and their managers are the main target audience for this dissertation.

The research questions are:

- To what extent are Portuguese PF exposed to equity home bias during the sample period?
- Does the investment behavior of Portuguese institutional investors in two markets vary across the asset class as well?
- Are bigger PF more likely to demonstrate home bias?
- Does experience matter to reduce Home Bias?
- Does cover ratio influence Home Bias?

In order to answer these questions above, we have structured the dissertation across six broad sections labelled as chapters:

The first chapter, Chapter 1, is the introduction to the topic. In Chapter 2, a brief introduction and characterization of the Pension Funds industry in Portugal and its evolution over time were made. In Chapter 3 the relevant literature on the subject has been reviewed. In Chapter 4, the nature of data and the methodology used has been described. Chapter 5, is the description of results obtained from our empirical study, and finally in Chapter 6, our conclusion is presented.

## 2. DESCRIPTION OF PENSION FUNDS MANAGEMENT ACTIVITY IN PORTUGAL

In this section, we will begin by talking about the pension funds' value in Portugal. This first sub-chapter is divided into the importance of the Pension Funds in Portugal and recent trends. After that, we will review the evolution of the Pension Funds during the last 8 years. We will finally compare Portuguese Pension Funds with other countries.

### **2.1. Pension Funds in Portugal**

#### **2.1.1. Importance and Latest Trends**

The source of income for retired citizens could be better explained via the analogy of the “System of the 3 Pillars” on Pension Funds as outlined by World Bank in 1994 and since then, adopted by many economically reforming countries in Central and Eastern Europe (Holzmann (2000)).

The first Pillar of the Pension Plan is the income provided by the State under the principles of solidarity and redistribution; the second Pillar is composed of the income provided by Pension Plans promoted by companies or other legal entities, and finally, the third Pillar is the income generated by individual savings that were held throughout life, including retirement savings plans.

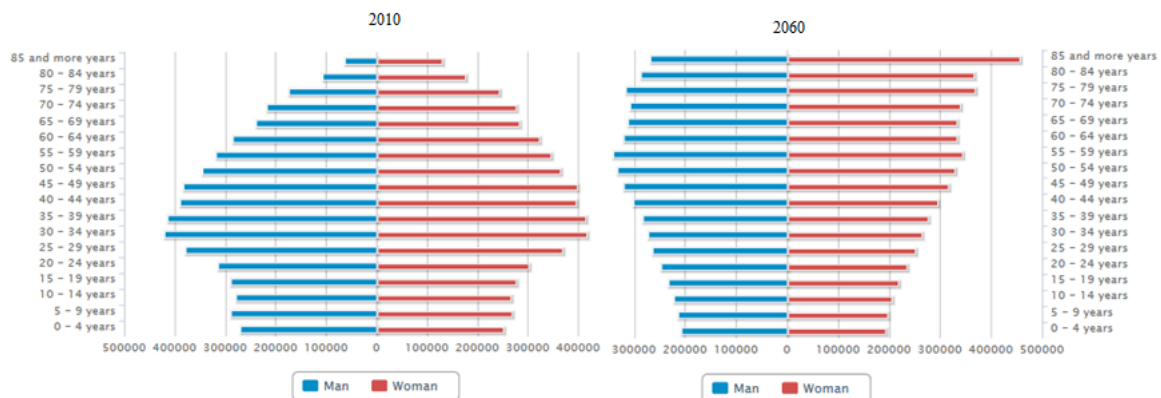
Pension Plans corresponding to the first Pillar are typically based on a system designated for distribution, in which contributions from active workers go towards payment of pensions of current retirees, with the expectation that the next generation of workers would do the same for them. So, there is no immediate and direct link between what a worker contributes to the system and what he may receive in future. The Portuguese Social Security system works within the realm of the above stated regime.

For such a system to be sustainable over time without severe tensions, it is necessary that there be a stable relationship between the number of pensioners receiving pensions and the number of workers who finance them. However, in Portugal it is expected that the relationship between active people, i.e. individuals aged between 15 to 65 inclusive and the

remaining, expressed in terms of dependence ratio, could grow from 49.6% in 2010 to about 79.5% in 2060 (INE) (Figure 1). Stated in other terms for each 10 individuals aged within the active group, dependent individuals are to grow from 4.96 in 2010 to 7.95 in 2060.

The increasing of this dependency ratio in Portugal will impose growth contribution rates on workers` wage to finance the pension plans.

Figure 1: Projections of Resident People in Portugal in 2010 and 2060



Source: INE – Statistics Portugal (July, 2015)

Recent demographic trends points towards a continued increase in life expectancy throughout the world, particularly in developed countries. The reasons could be attributed both to the drop of birth rates and of death rates of older people. This raises serious concerns with respect to financing the Social Security System. According to the estimates of the latest Resident Population as of 31<sup>st</sup> December 2013, 10.4 million people lived in Portugal (INE). As per the estimates of Statistics Portugal (2015), the population is set to drop to 8.6 million by 2060.

In Portugal, the net replacement rate (i.e. the value of the pension to be received from Social Security divided by the final salary, both net of taxes) could reach 100%, and, in some situations, the pension may even exceed the last salary. Because of this situation, we still have a reduced expansion of the Pension Funds in the country.

In turn, the Pension Funds, which are the privileged vehicle financing of the Pension Plans, may take the form of closed or open funds. It is considered that a pension fund is closed when it concerns only one associate or, when it has several members, it should have a corporate bond nature, be it associative, professional, or social between them; and it is necessary that their agreement (from all the members) include a new member in a closed fund. On the other hand, a pension fund is considered open when it is not required that there be different members in the fund; and acceptance by the management company is the only requirement to become a member of an open fund.

The closed Pension Funds may be established on the initiative of a company or groups of companies, associations, including socio-professional level, or with the agreement between the employers and unions. On the other hand, the open PF's could be established by an authorized entity. Their total net worth can be divided into units of participation, whole or fractional, which can be represented by certificates. The open PF's allow plans for companies to fund the retirement benefits of employees using the Pension Funds irrespective of their size pension plan.

Table 1 – Structure of Pension Funds in 2013

	Number	Value	Structure (%)	Insurance Entity	Companies
Number of Pension Funds	224	17078	100%	2638	14440
PPR	24	421	2,47%	6	415
PPA	3	2	0,01%	0	2
Other Open Funds	51	1429	8,37%	381	1048
Closed Funds	146	15227	89,16%	2251	12976
MARKET SHARE (%)				15,45%	84,55%

Source: ASF (Autoridade de Supervisão de Seguros e Fundos de Pensões),  
Statists, Structure of the Market in 2013

In 2013, the Pension Fund, both in terms of number or the amounts managed were mostly closed funds, which is explained by the size of the major companies that promoted them (banks besides large companies from the public sector). The structure of Pension Funds in

2013 in relation to the market share is constituted by Companies in 84.55% and by Insurance Entity in 15.45%.

### 2.1.2. Evolution

Pension Funds' growth and their importance is intimately linked to the level of Social Security Payments. There is a high degree of interdependence between state welfare, corporate and personal provision and they are complementary in many ways. We will present and discuss the evolution of the Pension Funds over the last 8 years.

Figure 2: Evolution of Pension Funds in Portugal



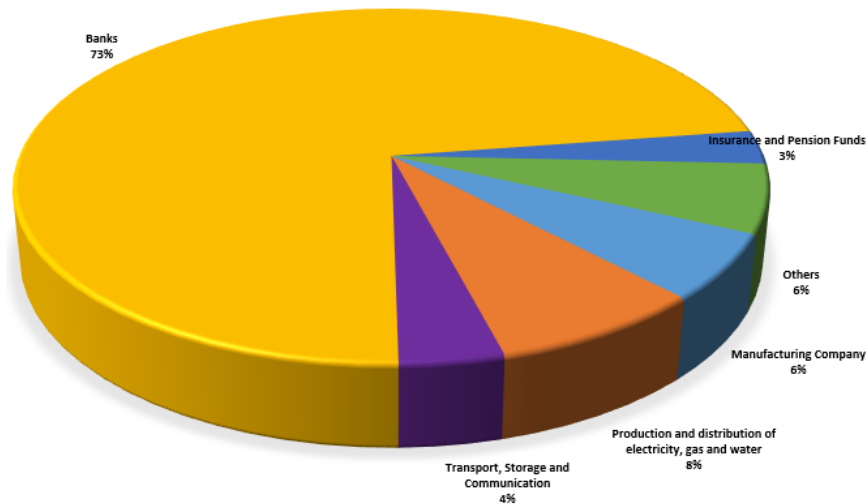
Source: EUROSTAT (2014), APFIPP (Portuguese Association of Investment Funds, Pension Funds and Asset Management)

From figure 2, it could be seen that the Pension Funds' value over the last 8 years have changed a lot. The most important thing to notice is that the pension funds' value increased since the economic crisis of 2008, followed by a drop in the next few years; and then subsequently there is a gradual increase. In addition, the Pension Funds currently have a total of around 290,889 participants. During 2013, the Pension Fund made payment of pensions

to more than 117,119 beneficiaries, approximately an amount of 536,333 million euros and received an amount of 889,473 million in the form of contributions.

Now, we will show the assets of Pension Funds by associated companies.

Figure 3: Assets of Pension Funds by associated companies in 2014



Source: ASF (Autoridade de Supervisão de Seguros e Fundos de Pensões), 2014

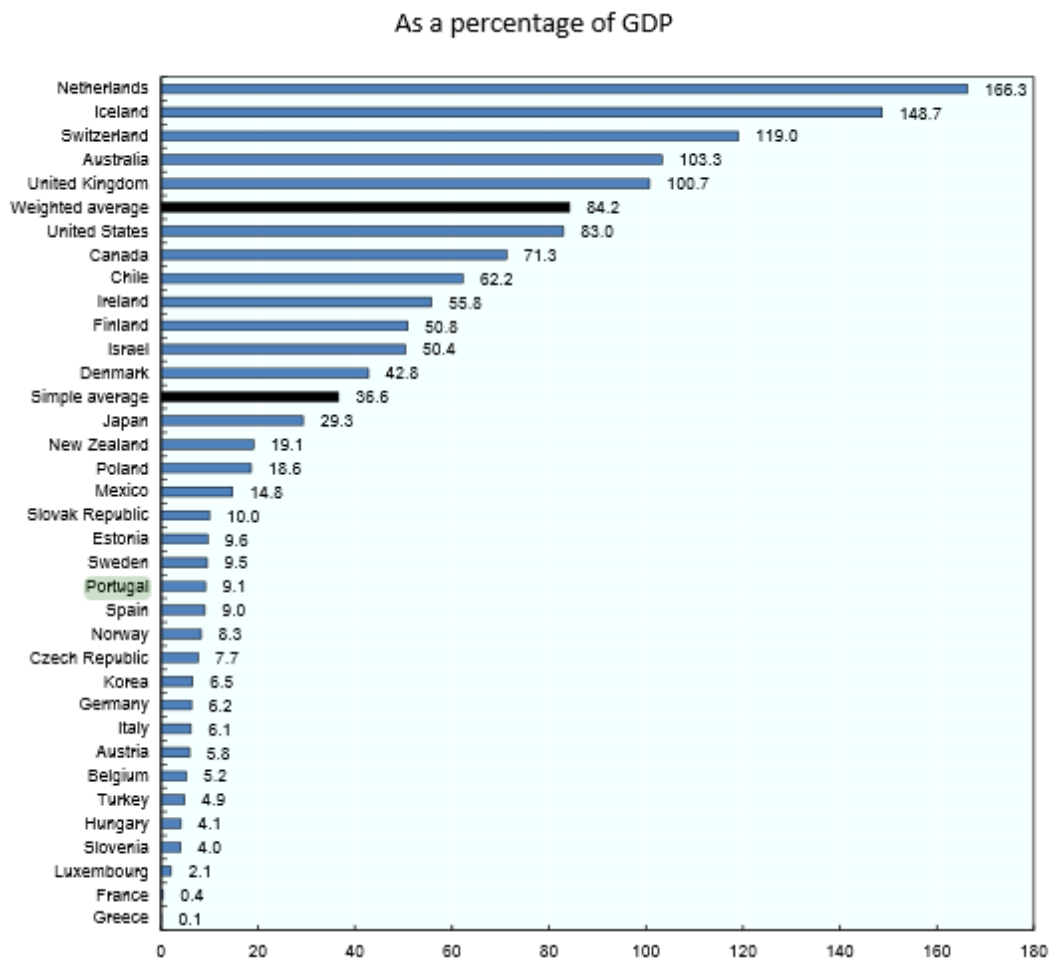
As we can observe from the pie-chart above, 73% of the assets of Pension Funds are associated with Banks. We can also notice that the pension funds that have credit institutions associated hold more than 80% of total financial assets. This scenario has been the same during the last years, in which the high growth of assets were recorded due to contributions of credit institutions who financed their benefit plans through pension plans. The postal and telecommunication companies have their own pension funds and so do a number of other companies from the public sector. Their pension plans were the result of collective agreements.



## 2.2. Portuguese Funds comparison with other countries

In some countries, pension funds are among the most important entities operating in the financial markets. Some pension funds have an experience of several decades. The continued growth of the Pension Funds and the potential use of control on corporate governance of the biggest US companies can have fundamental implications in the structure of the American economy.

Figure 4: Importance of pension funds relative to the size of the economy in the OCDE



Source: OCDE (Organisation for Economic Co-operation and Development), 2014

As it can be observed from figure 4, in countries such as Netherlands, Switzerland and the United Kingdom, value of the assets of Private Pension Funds represent over 100% of GDP. In contrast, in some other countries the relevance of Pension Funds is not significant due to their social security systems (that does not allow having space for other private systems) or tax regimes which do not recognize, in most cases, the efforts of the companies to provide retirement benefits to their workers.

In Portugal, the first pension funds emerged in 1987, after the creation of a favourable legal framework and the implementation of a strong fiscal regime in 1987 and 1988. Since then, the creation of Pension Funds was, in the most advanced social organization of countries, a form of Private social security that best meets the protection needs of citizens.

Only in that initial period of two years, 149 Pension Funds appeared in Portugal. In 2014, the Pension Funds' assets represented an amount of 16,718.4 million of euros, which correspond to about 10% of GDP.

In recent decades, the Pension Funds have achieved a strong dynamism in the Portuguese capital market. The cause of their increasing importance is the many advantages they provide: greater diversification of risk due to investment capacity in different markets, sectors and companies; a high liquidity because the units are easily convertible into money and the possibility of achieving economies of scale, since the entities managers have a greater bargaining power that allows them to reduce the costs of transaction and transform them into a more favourable operations (Chordia, 1996).

### 3. LITERATURE REVIEW

A great number of investment restrictions during the last 20 years have been raised by numerous nations. The liberalization of international capital flows and the domestic financial markets' deregulation have promoted trading assets abroad. In addition to this, most of the global portfolio theories' choice concluded that worldwide diversification does better than the diversification at the national level and that it surges to emphasis on emerging markets (Solnick (1974); De Santise and Gerard (1997); Errunza (1977)) among others. In spite of this, it seems that fund managers have successfully accommodated these findings in their asset selections for optimal portfolio diversification.

Having said that, in this section we have discussed the most relevant literature concerning Home Bias and tried to establish its relevance with respect to Portuguese investors in their asset selections for portfolio diversification by studying Portuguese Pension Funds.

#### 3.1. Equity Home Bias

The potential benefits from international diversification have been known for decades by investors (Levy and Sarnat (1970)), although the majority of investors still do not invest in foreign securities or hold a very small portion of foreign securities on their portfolio. This discrepancy between actual and optimal international equity portfolios is well known as the Equity Home Bias.

“Home bias occurs when the observed asset holdings of an investor contain a smaller proportion of foreign assets than the optimal predicted by portfolio theory for the observed set or risks and returns on available assets on the one hand and the risk appetite of the investor on the other hand “ (Babilis and Fitzgerald (2005)). Obstfeld and Rogoff (2000) identify “Equity Home Bias” as being one of the six major puzzles in international macroeconomics.

Researchers also discovered other shapes of “Home Bias”. As an example, it is documented that U.S. fund managers exhibit a strong preference for firms with local headquarters (Coval and Moskowitz (1999)). Huberman (2001) reports the geographical bias of regional Bell shareholders. It was discovered that a larger proportion of the shareholders of a regional Bell

operating company tend to live in its service area than would be expected. Benartzi (2001) and, Huberman and Sengmuller (2004) came to the conclusion that employees tend to spend a large proportion of money of their retirement plans in their own company's stock. Grinblatt and Keloharju (2001) also reported Home Bias among Finnish.

### **3.2. Empirical Evidence**

The contemporary empirical literature written about this phenomenon gives inconsistent opinions concerning the existing of the Equity Home Bias.

The phenomenon has been examined by many authors during the last 20 years. According to Daly and Xuan (2013), barriers had been an obstacle to foreign investment. However, with the declining of the barriers, Equity Home Bias should also vaporize. This "vaporization" should be more substantial for investors which produce low transaction costs on financial markets, in particular, Institutional Investors such as Pension Funds.

Empirical evidence shows that with the liberalization of international capital markets the deviations concerning the values of equities on domestic markets decline comparative to international markets (Lewis (1999)). Some authors such as Covring et al. (2007) found signals that Equity Home Bias diminished and international investment improved in the European Union since the adoption of International Accounting Standards (IAS) in 2005.

Opposite to this thought, some authors such as Gorman and Jorgensen (1996) and Bekaert and Urias (1996) defended that there is no Home Bias. They stated that the development of the portfolio performance does not depend of foreign diversification. Their studies contain uncertainty related to the optimal choice of foreign security holdings. They also reported that the simple comparison of historical means and variances of domestic and foreign stocks returns suggests that investors should invest the major part of their money in foreign stocks. To summarize, the authors demonstrate that when this hesitation is taken into account, there is a little alteration in the performance of portfolios with foreign investments in comparison to portfolios that only have domestic stocks.

On the other hand, a large part of the literature written about this phenomenon confirms the presence of Home Bias. Notwithstanding, the fact that international investment barriers

ceased due to phenomenon of economic globalization, the preference for domestic securities between investors did not relax, and the phenomenon of Equity Home Bias is still predominant among Institutional Investors (Li *et al.* (2007)). The literature has highlighted the fact that investors do not hold world market portfolios and arguments that investors assign only a very small fraction of their portfolios to their foreign investments.

Tesar and Werner (1995) indicated that there was a strong evidence of Home Bias in Organization for Economic Co-operation and Development (OECD) countries of portfolio investors. Despite the potential gains from diversification and intensification in international investments positions, the share of foreign assets in investment portfolios is considerably lower than the standards model would predict. Kang and Stulz (1997) confirmed the existence of considerable home bias and reported that the ownership by foreign investors is strongly biased against small firms.

Correlations on returns on equity portfolios between countries are far from being perfectly positive. Lewis (1999) made an analysis on monthly data from January 1970 to December 1996 in which the median correlation on returns between G-7 countries (US, Canada, France, Germany, Italy, Japan and UK) is only 0.38.

Besides that, the fraction of portfolios held in domestic equity exceeds the domestic market capitalization. For instance, Cooper and Kaplanis (1994) reported that, for the year 1987, US investors held 98% of their equity portfolios in domestic equity while the US equity world market capitalization was only 36.4%. However, there are countries where this disproportion is even more pronounced, e.g. 75.4% against 3.2% for Germany and 94.2% against 1.1% for Spain.

### **3.3. Explanations for the Home Bias**

The natural question to ask is why so few investors pursue these investments given the benefits from investing in foreign securities. Many authors tried to solve this mystery, worrying primarily about institutional explanations and largely neglecting individual investor behaviours. French and Poterba (1991) were the first to suggest the distinction between institutional and behavioural explanations. We follow the same distinction.

### **3.3.1. Institutional Explanations**

Institutional explanations for the equity home bias mostly follow cost-benefit analyses of international investments: the costs of international diversification may compensate the gains. Jeske (2001), for instance, defends that domestically biased portfolios are associated with losses up to several hundred basis points compared to the optimal portfolios.

- Better Hedge

Some authors defend that domestic equities deliver with a better hedge against home country-specific risks. Three types of hedging are distinguished: hedges against domestic inflation; hedges against wealth non-traded in capital markets and; hedges with foreign returns implicit in equities of domestic firms that have overseas operations (Lewis (1999)).

#### ➤ Barriers to International Capital Flow

Literature highlights the importance of barriers to international capital flow, which are for example, transaction costs, taxes, market frictions and restrictions on capital holdings by foreigners. Under this form of market imperfection, general and complex asset pricing relations have emerged, namely, Black (1974) who found that transaction costs have the potential in explaining the equity home bias and showed that the severely taxed investors tend to invest more in their domestic markets.

Nonetheless, he does not take into account the currency risk. Stulz (1981) made some restrictive assumptions of the model of Black (1974). He changed the model of international asset pricing in which there is a cost associated with holding either long or short risky foreign assets. He contemplated that the investment taxation varies with countries and assets. In fact, he presumed that only domestic investors face barriers to international investments. The identical asset can be priced differently for domestic and foreign investors.

Lewis (1999) defends that if the costs of holding foreign stocks do not overweight the profits of diversification, investors will desire to invest only in domestic markets. Investors choose to invest in countries where they have less costs (Daly and Xuan (2013)).

➤ Transaction costs and Tax Incentives

Tesar and Werner (1995) illustrate in an empirical study that high transaction rates of foreign equity contradict the explanation of the home bias in terms of transaction costs. French and Poterba (1991) defend that if the transactions cost argument holds, then traders should invest in most liquid and not necessarily in the domestic market. In recent years, capital markets have been substantially liberalized. We would expect that this liberalization alleviate the equity home bias, however, empirical evidence indicates that international under diversification prevails (Lewis (1999)).

Pension Funds, that are institutional investors tax-free, suffer reduction in the return of foreign investment associated to domestic investment as a result of foreign withholding taxes (Tesar and Werner (1995)). It is clarified by transaction costs that investors prefer to invest in domestic assets. These expenses affect equally asset returns and investment decisions. These boundaries, as a consequence, generate market segmentation which discourage some investors to invest abroad. Market segmentation is attributed to boundaries forced by governments to preserve the control of domestic companies. In this context, international investors trade the identical asset with different prices, reason why they demand a premium in order to expand their investment internationally.

➤ Asymmetric Information

A further possible explanation for the equity home bias is the asymmetric information with respect to domestic and foreign equity. Some foreign companies which are not cross-listed in domestic markets require the understanding of different types of foreign standards (Lewis (1999)). If investors do not have a good understanding of the accessible information, it affects their portfolio choice and impacts their decisions of investment time and drives them to bad investment performance (Li *et al.* (2007)). Consequently, investors participate in the market in a way they can most simply access to firm information (Fedenia *et al.* (2013)). Asymmetric information is considered to be the driving force of observed investments in firms that are geographically proximate to the investors. Brennan and Cao (1997); Gehring (1993); Kang

and Stulz (1997) and Low (1993) defend that domestic investors have superior information about payoffs on the domestic market, which lead to a higher demand for domestic equity.

- Cultural Differences

The superficial differences in languages, standards, habits and distance from international capital markets might cause investors to hesitate in spreading their portfolios internationally. Accessibility of information may fluctuate significantly from one domestic market to another. This traditional information, if obtainable, may be difficult to interpret into familiar standards for comparison determination. As a consequence, individuals capitalize predominantly in home assets and hold poorly differentiated portfolios.

Merton (1987) states that investors invest merely on assets that they are knowledgeable about and reach the conclusion that less well known assets of businesses with reduced investor bases tend to have comparatively superior expected returns.

Kang and Stulz (1997) used information on foreign stock ownership from 1975 to 1991, in order to observe the causes of the home bias in portfolio holdings. They discovered that foreign investors overweight shares of big Japanese firms, manufacturing industries and firms with good accounting performance, due to the fact that investors have an easy access to information about those companies. Ahearne *et al.* (2004) found that the asymmetry information, due to poor quality sources and low credibility, in many countries may cause hesitation, making it harder for the investors to invest in foreign markets.

After these institutional explanations, rooted in financial literature, we will look at the behavioural explanations of this phenomenon.

### **3.3.2. Behavioural Explanations**

The Behavioural approaches to the equity home bias rise proportionately to the psychological aspects of individual behaviour. In the literature review, most of the companies predict a very optimistic performance of domestic firms. As so, the subjective competence in the home market has been debated as a possible explanation for the equity home bias from a behavioural perspective.



- Investor's competence

Graham *et al.* (2005) suggested an explanation based on investor's competence. Investment understanding and sophistication have a strong influence on the investment portfolio (Li *et al.* (2007)). A better understanding of the security market and a rich investment experience support and lead to more differentiation on the investment portfolio. Graham *et al.* (2009) defend that an investor who feels capable and confident about the understanding of the benefits and hazards involved in investing in foreign assets is more prepared to invest in foreign securities and recognize less uncertainty about his subjective distribution of future asset returns.

The optimism of the investors is also an explanation for the equity home bias from a behavioural perspective.

- Optimism

Kilka and Weber (2000) and Strong and Xu (2003) suggested that home bias arises because investors tend to be more optimistic regarding home markets compared to international markets. There are other studies that support these theories. Graham *et al.* (2005), for example, discovered that investors with more competence are more likely to invest in international assets. Vissing-Jorgensen (2003) discovered also that high wealth households are more likely to invest in foreign securities and defended that this attitude is consistent with high wealth households paying the information cost related with the investment in foreign assets.

It has been also discovered that investors' belief that the stocks in their countries have more competitive power than the foreign ones (Kilka and Weber (2000)). Strong and Xu (2003) reported also a strong tendency for managers to be more optimistic about market in their home country than about the rest of the world. Investors tend to invest more in securities of which they know more. Similarly, they tend to invest in securities which are known to them abroad (Merton (1987)).

The familiarity for investors is also an explanation for the equity home bias from a behavioural perspective.

- Familiarity

Familiarity is related to cultural familiarity, common language, industrial development and existence of tax treaties (Fedenia *et al.* (2013)). Investors seem to hold stocks of corporations with which they are familiar (Daly and Xuan (2013)). Markets geographically close are frequently followed more by the media (Fedenia *et al.* (2013)). Investors desire more familiar corporations, usually large, safe and internationally noticeable firms (Kang and Stulz (1997)).

Huberman (2001) made an empirical analysis of the geographic distribution of shareholders of the Regional Bell Operating Companies and proposed that individuals tend to invest in companies on which they have superior information or at least about which they think that they have superior information. Investors seem to have static portfolios and they prefer to buy and hold familiar stocks than sell them. These findings do not sustain the asymmetric information approach, which predicts the abuse of informational advantages by an active trading strategy. Barber and Odean (2002) also confirmed the familiarity hypothesis by demonstrating that, particularly individual investor, tend to exhibit attention-bases buying behavior.

Familiarity with domestic companies, overoptimism and subjective competence are plausible explanations for the equity home bias, however, they simply might be related to a more fundamental underlying social process, namely social identity. Tajfel and Turner (1979) define social identity as a group membership based on self-categorization, social comparison and the construction of a shared self-definition. Self-categorization refers to the process of being oneself as a member of a social group. Social comparison serves as a means to pathway similarities and differences between oneself and social group. Every individual belongs to different groups, for instance with respect to ethnicity and religion, political affiliation, family and professional affiliation (Smith (1991)). Hopkins and Murdoch (1999, p.321) defend that the most salient affiliations is nationality: “Of all of the categories relevant for self and other definition, the category of “the nation” is perhaps the most politically significant”. Due to that, social identity has been suggested as an adequate concept to understand national phenomena.

## 4. DATA AND METHODOLOGY

In this section we will begin by addressing the studied data. After that, we will update the distribution of Home Bias across market and asset classes on the Portuguese market. To finalize, we will explore some hypothesis about Home Bias and Pension Funds characteristics and show the model adopted in this study.

### 4.1. Data

We obtained the required data of PFs for analysis from supervisory authority of Comissão de Mercado de Valores Mobiliários (CMVM). This entity, in Portugal, is responsible for prudential regulation of all the Funds and it is also responsible for the submission of laws and regulations. Under the supervisory entity CMVM we can find public detailed information about each fund, namely the detailed information about the portfolio and balance sheet of each Portuguese fund's holdings, on a quarterly basis.

As of 2014, there were 224 Mutual Funds operating in Portugal. Given the limitations of time, we decide to focus our study on PPR funds instead of all the available funds. Another reason why we choose PPR funds was the value being managed by them, an amount about 367,082 million euros, followed by PPA funds (Plano Poupança Ações) which have a meagre 3,345 million euros under management.

Most of the studies of Home Bias in PF's have used annual data that had varied from 14 years (see Rubbaniy *et al.* (2013)) to 20 years (see Gerke (2005)). We will also be using annual data, but we were only able to analyze temporal data of the past eight years, because there is no complete public information of these funds prior to 2006 on CMVM. These reports contained detailed information about the positions in domestic and foreign assets, liabilities and net income.

Within each PPR fund there was information about equity, fixed income, money market papers, real assets to name a few. However, we have focused on stocks (riskier assets) and bonds (assets with less risk) in this dissertation, since, the data for both assets is very detailed and easily accessible. Also, stocks and bonds hold the largest proportion on the PPR fund's net asset. Between 2006 and 2014 we had 16 PPR Funds; however our study is only considers

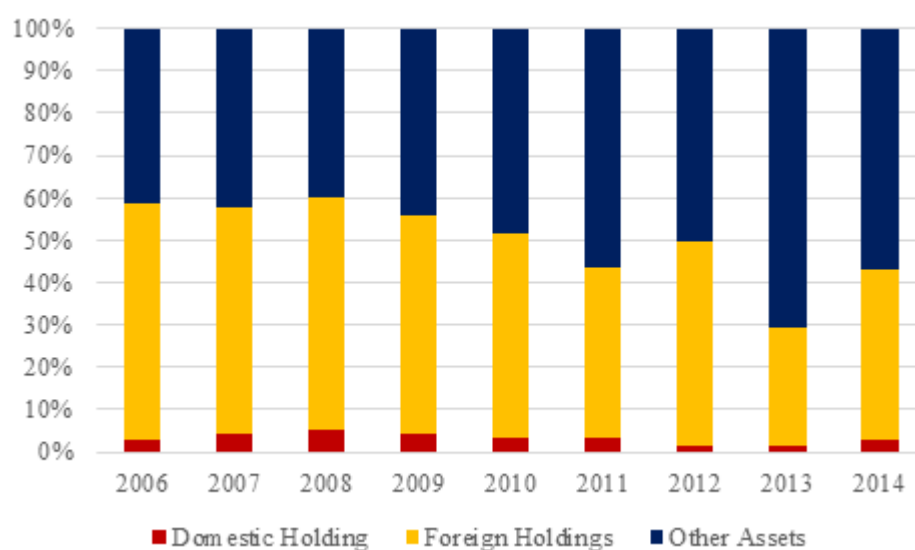
by 14 PPR Funds, since the other two funds did not have any bond or stock during the sample period.

While addressing the question “Do Portuguese Institutional Investors suffer Home Bias?” another question naturally arises: “Does the investment behaviour of Portuguese institutional investors in two markets varies across the asset classes as well?” To answer this question we explore home bias in Portuguese PPR PFs` investment behaviour across their asset mix.

## 4.2. Home Bias across market and asset classes

We begin by analysing the evolution of the average home and foreign holdings in investments as a percentage of total Portuguese PPR PFs` holdings from 2006 until 2014. The same is illustrated in Figure 5.

Figure 5: Progression of domestic and foreign yearly average percentage holdings of all asset classes.



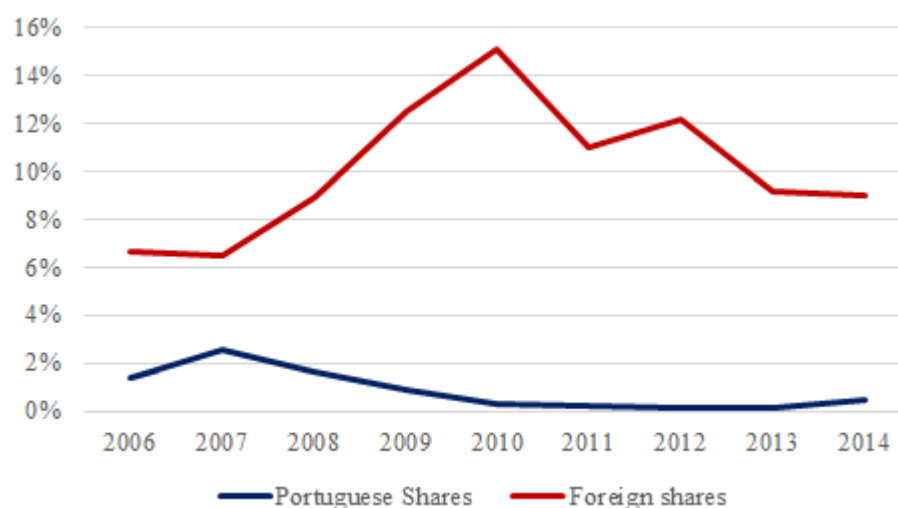
Source: (CMVM<sup>1</sup>)

<sup>1</sup> Notes: Figure 5 exhibits the yearly asset weighted average domestic and foreign asset allocation of Portuguese PPR PFs as a percentage of total holdings. Here, domestic holdings = domestic equities + domestic bonds and, foreign holdings = foreign equities + foreign bonds and other assets are the assets comprising all the asset categories other than equities and bonds.

From the figure above we could infer that for the sample, bonds and equity constituted more than 50% of total assets. Only for years 2011, 2013 and 2014 the percentage was slightly below 50%. We can also notice that most of the equities and bonds on display were foreign. Finally, from 2006 until 2014 the share of holdings in domestic equities and bonds varied between 1% until 4%. This led us to believe that the Home Bias in Portugal is practically non-existent. There has been a slight decrease over time in the average home bias in the portfolio choices of Portuguese Institutional investors. Probably it could be because our data only starts in 2006, so, by that year the Home Bias in the world and Portugal in particular is almost inexistent or the percentage of HB is very small due to the fact that there is a well-developed incorporation of financial markets, huge widespread of financial knowledge and the consciousness of risk awareness.

It becomes imperative at this point to investigate the evolution of bonds and stocks separately across markets. We have tried to demonstrate our findings regarding the same in the discussion that follows, accompanied with respective figures (figure 6 for equities and figure 7 for bonds).

Figure 6: Evolution of yearly average percentage holdings of equities across markets

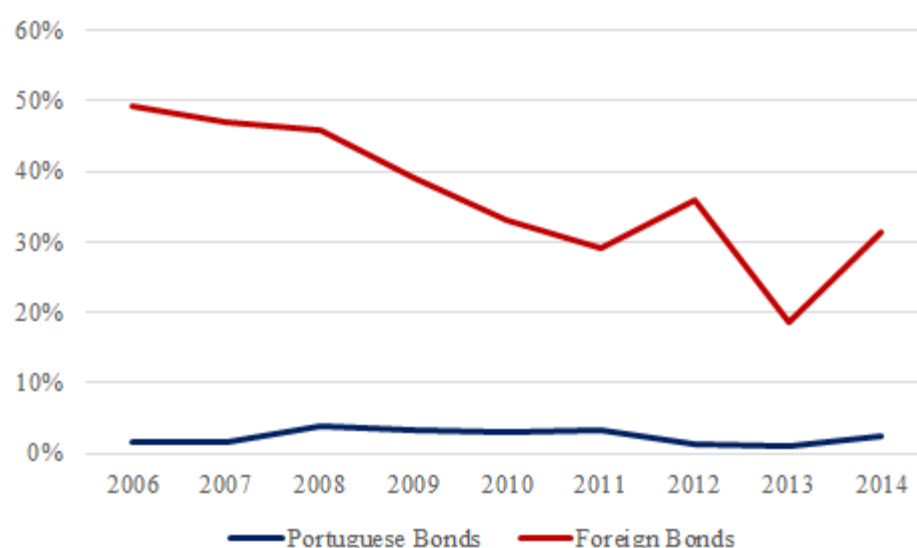


Source: CMVM<sup>2</sup>

<sup>2</sup> Notes: Figure 6 shows the yearly asset weighted average of equities positions of Portuguese PPR PFs as a percentage of total holdings across domestic and foreign markets.

It could be observed from the figure above that for Portuguese PPR holdings, shares are practically non-existent. The value of the Portuguese shares had the highest value of 2% in 2007 followed by a decrease over time. It is clearly visible that during the penultimate years, they are almost 0%. With regards to foreign shares, in 2006 Portuguese PPR Funds held 7%, and this value increased during the subsequent years until it reached the highest value at 15% in 2010. In the year of 2011 this value was 11% and in 2014 was 8%.

Figure 7: Evolution of yearly average percentage holdings of bonds across markets



Source: CMVM<sup>3</sup>

With regard to bonds, the findings are similar to those of the shares, with a bigger percentage of the bonds belonging to foreign markets. However, for foreign bonds it reaches the highest value on 2005 with 50% of holdings. This value starts to decrease over time until 2011 when the holdings were only 30%. It increases again in 2012, but in 2014 the percentage of foreign

---

<sup>3</sup> Notes: Figure 7 shows the yearly asset weighted average of bonds positions of Portuguese PPR PFs as a percentage of total holdings across domestic and foreign markets.

bonds was around 31%. Despite this decrease over time, this value is still much bigger than the 3% of Portuguese bonds on 2014.

### **4.3. Methodology**

After we develop the theory between Home Bias and PF's characteristics, we took into consideration our available PPR Portuguese data in and used descriptive statistics and also regression analyses to verify the same.

#### **4.3.1. Hypothesis and Model**

In the preceding section, we tried to illustrate Home Bias in the context of Portuguese PF and described the dynamics in asset distribution across financial markets as well as asset class. In this section we will now concentrate on building the relation between Portuguese PF's asset allocation and their individual characteristics.

The first relation that we found is that institutional investors have better resources than individual investors to overcome the barriers and obstacles to international investments. Bigger pension funds employ analysts that can diminish information asymmetries and can negotiate lower tariffs for international deals (Lewis (1999); Chan *et al.* (2009)). For this reason, pension funds face less information asymmetries when compared with individual investors. This led us to believe that bigger pension funds hold more foreign assets than the small ones. The higher domestic position in bigger pension funds could result in an inefficient portfolio variation and expose the fund to a bigger risk in case the domestic market does not perform well.

Correspondingly, worldwide diversification becomes inefficient for smaller pension funds due to higher transaction costs (Rubbaniy *et al.* (2010)). Large pension funds, on the other hand, have the capacity to reduce the high investment costs by trading in bulk, which reduces the marginal transaction cost as well. Considering all these factors, it is possible for the bigger PF to keep the portfolio risk, while at the same time reducing acquisition costs and increasing the expected returns (Rubbaniy *et al.* (2010)). Consequently, higher trading costs argument joined with scale economies could provide the large PFs with more chances to internationally differentiate their portfolio. Given all these findings, it is expected that:

**H<sub>1</sub>:** The bigger pension funds are less likely to demonstrate home bias.

The second relation that we found is that investment experience, the complexity of finance instruments and the capability of institutional investors influence the distribution on the investment portfolio, according to Li *et al.* (2007). All these reasons incentive a PF management to recognize concretely how well an investment strategy is adequate for an investment opportunity. International investment experience increase abilities and the intensification of current skills for a PF through its operations in foreign markets. Less skilled, sophisticated and capable funds may intentionally select a lower risk profile for their asset allocation. The most advanced funds have expertise and use sophisticated modelling methods which may make them less unfavorable to risk taking (Dreu and Bikker (2010)). The collected knowledge through on-going process in worldwide financial markets that contributes to the common knowledge and vital competences for proficient asset distribution and risk diversification it is known as operational age (Rubbaniy *et al.* (2010)). Consequently, we believe that PFs with additional operational age are more likely to have less home bias.

**H<sub>2</sub>:** The mature pension funds are less exposed to home bias.

The last relation considers the cover ratio, a significant mechanism variable for the assets of Portuguese PFs. The cover ratio compare the assets with the technical necessities (liabilities) in the balance sheet of a PF. Higher cover ratio means that a pension fund has additional buffer against portfolio risks and may tolerate higher transaction costs in order to obtain higher returns (Rubbaniy *et al.* (2010)). International diversification suggests the possibility of higher returns at any given level of risk, so, PFs with higher cover ratio are expected to show more worldwide diversification or less home bias.

**H<sub>3</sub>:** The higher the cover ratio, the less is the pension fund exposed to home bias.

To resume, in section 4.1 we have described the data that we use on this study. In section 4.2 we have discovered that the percentage exposure on national markets by Portuguese PPR PFs` is practically non-existent over the experimental period; with both shares and bonds of international markets representing a big share of the total. In the following section we clarify



the importance of additional influences that may impact Home Bias in Portuguese PFs such as: size, age and cover ratio.

Our goal is to find a model that fits and best describe our assumptions by an appropriated relation among PPR PFs` asset distribution and their individuality characteristics. As other authors propose on their studies, we propose a linear panel data model to statistically check our theories and the typical expectations for linear panel data model that might integrate these variables as a whole.

Correlation matrix contains different influences in our proposed linear panel data regression model, in order to study how much variation is explained by each of the factors the model include.

In order to do this, we generate different regressions to analyse the home bias assets hold by the whole Portuguese PPR PF based on individually PF`s characteristics and time fixed effects. These regressions are also generate separately for equities and bonds, and are modeled as:

$$A = k + L_{it} + B_{it} + CR_{it} + \varepsilon_{it} \quad (1)$$

$$E = k + L_{it} + B_{it} + CR_{it} + \varepsilon_{it} \quad (2)$$

$$C = k + L_{it} + B_{it} + CR_{it} + \varepsilon_{it} \quad (3)$$

Where, (A) is used to express the proportion of domestic to foreign exposures for equities and bonds across markets that are held by the PFs at time t; (E) is used to express the proportion of domestic to foreign exposures for equities across markets that are held by the PFs at time t, and (C) is used to express the proportion of domestic to foreign exposures for bonds across markets that are held by the PFs at time t.

The variable constant (k) symbolizes PF`s specific effect, which do not diverge over time however vary transversely PFs. The variable ( $\varepsilon$ ) is a residual variable that represents error terms. The additional variables shows the effects of each PF`s particular characteristics of

national to foreign exposures and, from global to different asset classes levels: it comprehends the logarithm of the total assets (L), operational age (B) and cover ratio (CR).

## 5. EMPIRICAL RESULTS

Time has a slightly positive influence on Home Bias during the experimental period, from 2006 until 2014. This decrease on the HB was observable across markets and also on different assets (in our case, bonds and shares), as we can confirm in figure 4, 5 and 6.

We will start by analyzing the relevant Descriptive variables for the dependent variable HB (representing Home Bias respectively) and some selected independent variables constituted by age, logarithm of size and cover ratio.

Table 2 – Descriptive Variables from 2006 until 2014

This table displays the informational variables statistics and computed for the period of analysis (from 2006 to 2014) on Portuguese PPR Pension Funds. The informational variables used are: Home Bias (HB), the logarithm of the total assets (L), operational age (B) and cover ratio (CR). All the information collected has been treated as annual data.

	HB	L	B	CR
<b>Mean</b>	0,35	17,16	11,15	234,52
<b>Maximum</b>	11,17	20,65	25,00	948,98
<b>Minimum</b>	0,00	14,56	0,00	0,94
<b>Std. Deviation</b>	1,37	1,59	7,13	205,90
<b>Observations</b>	108	123	123	123

The sample is constituted by 123 observations from 2006 until 2014. In our sample, the average HB in the Portuguese PPR PF was almost inexistent, with a mean of 0.35. If we check Table 2 we can notice that the minimum value for the home bias in our sample is 0, which means that we have some funds that invest exclusively in foreign assets. Finally, the maximum value over the period analyzed is 11.17, which is still a very low amount.

With respect to the operating age of our sample, represented by (B), there are small differences between the funds in relation to their age. On average the funds in our sample are 11.14 years old and have a stand deviation of 7.13 years. Due to that, the youngest fund of our sample is 0 years and the most mature firm on the market is 25 years. We can notice that

our PPR funds are very young when compared with the other developed countries in Europe and United States. In relation to the logarithm size of our sample, represented by (L), we have a mean of 17.16 and a stand deviation of 1.59. In relation to the cover ratio, represented by (CR), the mean is 234.52 and the stand deviation is 205.90.

In order to study the individual effects of each variable, we analyzed the correlation matrix for the variables that were analyzed in our regressions (available in Table 3). It is important to refer that in this analysis; the relation between variables was considered individuality.

Table 3 – Correlation matrix for the variables that were analyzed in our regressions from 2006 until 2014

This table aggregates the funds Correlation matrix characteristics logarithm of the total assets (L), operational age (B) and cover ratio (CR) from 2006 to 2014 on PPR Portuguese Pension Funds. All the information collected has been treated as annual data.

	<b>HB</b>	<b>L</b>	<b>B</b>	<b>CR</b>
<b>HB</b>	1			
<b>L</b>	0,60	1		
<b>B</b>	0,18	0,51	1	
<b>CR</b>	-0,07	-0,10	0,07	1

According to the results that we obtained, there is a modest optimistic correlation between equity home bias and age ( $r = 0.18$ ) which contradicts Hypothesis 2. Between equity home bias and logarithm size, accordingly to the theory, we had been expecting a negative direction as predicted by Hypothesis 1, however the correlation is statistically significant and in the opposite direction ( $r = 0.60$ ). This is inconsistent with Hypothesis 1. Similarly, there is an undesirable correlation between equity home bias and cover ratio ( $r = -0.07$ ). This correlation is irrelevant and consistent with Hypothesis 3. Besides this, there is a strong correlation between age and logarithm size ( $r = 0.51$ ) demonstrating that the more mature the pension fund is, the fewer it becomes in terms of total assets. Between age and cover ratio there is a positive and insignificant correlation ( $r = 0.07$ ), and, between size and cover ratio there is a

negative and insignificant correlation ( $r = -0.10$ ), an effect that's was studies before by (Rubbiani *et al.* (2010)) that demonstrated that the liability structure drives the equity allocations across markets in small pension funds.

We will now analyze the results that we obtained when we generated the 3 equations from the Model:

Table 4 – Regression analysis of the Home Bias in Portuguese PF's asset allocation from 2006 until 2014

This table exhibits a sample of the representative PPR Portuguese Pension Funds performance results for the period from 2006 until 2014 based on the estimates of the regression (1)  $A = k + L_{it} + B_{it} + CR_{it} + \varepsilon_{it}$ , where A is used to express the proportion of domestic to foreign exposures for equities and bonds together, the variable constant (k) symbolizes PF's specific effect, which do not diverge over time however vary transversely PFs, the logarithm of the total assets (L), operational age (B) and cover ratio (CR). The variable ( $\varepsilon$ ) it is a residual variable that represents error terms. All the information collected has been treated as annual data. The asterisks are used to denote the statistically significance at 1% (\*\*\*), 5% (\*\*) and 10% (\*) level.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>c</b>	1,06	1,55	0,69	0,49
<b>L</b>	-0,02	0,09	-0,22	0,82
<b>B</b>	-0,04	0,02	-1,92	0,06*
<b>CR</b>	0,00	0,00	0,81	0,42
<b>R-Squared</b>	0,06			
<b>Prob (F-statistics)</b>	0,11			

Notes: The dependent variable is the ratio of domestic to foreign assets. The PF size is the logarithm of the total assets held by a PF in a particular year. The cover ratio is the ratio between a PF's assets and its technical provisions. The age is the number of years that a PF has been in operation.

From the observation of Table 4, we found that the only variable that is statistically significant is age, since the p-value is 0.06. Age is statistically significant at 10% level. The R-Squared is a statistical measure of how close the data is to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determinations for multiple regressions. The R-Squared of Home Bias in Portuguese PPR PF's asset allocation is 0.06, which indicates that the model almost does not explain none of the

variability of the response data around its mean, only 6%. F-Statistic, indicates if a group of variables is jointly statistical significant. In this case, the group of variables is jointly significant at 11% (which is good because is near zero). So, the group of variables explain globally the model.

Table 5 – Regression analysis of the Home Bias in Portuguese PF's Equity holdings

This table exhibits a sample of the representative PPR Portuguese Pension Funds performance results for the period from 2006 until 2014 based on the estimates of the regression (2)  $E = k + L_{it} + B_{it} + CR_{it} + \varepsilon_{it}$ , where E is used to express the proportion of domestic to foreign exposures for equities, the variable constant (k) symbolizes PF's specific effect, which do not diverge over time however vary transversely PFs, the logarithm of the total assets (L), operational age (B) and cover ratio (CR). The variable ( $\varepsilon$ ) it is a residual variable that represents error terms. All the information collected has been treated as annual data. The asterisks are used to denote the statistically significance at 1% (\*\*\*), 5% (\*\*) and 10% (\*) level.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>c</b>	-21,58	64,95	-0,33	0,74
<b>L</b>	2,16	3,99	0,54	0,59
<b>B</b>	-0,28	0,91	-0,30	0,76
<b>CR</b>	-0,02	0,03	-0,56	0,57
<b>R-Squared</b>	0,01			
<b>Prob (F-statistics)</b>	0,85			

From the observation of Table 5, we could observe that there no statistically significant variable. The R-Squared is a statistical measure of how close the data is to the fitted regression line. The R-Squared of Home Bias in Portuguese PPR PF's equity holdings is 0.01, which indicates that the model almost does not explain none of the variability of the response data around its mean, only 1%. F-Statistic, indicates if a group of variables is jointly statistical significant. In this case, the group of variables is jointly significant at 85% (which is bad because is near 100%, which means that group of variables does not explain globally the model).

Table 6 – Regression analysis of the Home Bias in Portuguese PF`s Bond holdings

This table exhibits a sample of the representative PPR Portuguese Pension Funds performance results for the period from 2006 until 2014 based on the estimates of the regression (3)  $C = k + L_{it} + B_{it} + CR_{it} + \varepsilon_{it}$ , where E is used to express the proportion of domestic to foreign exposures for bonds, the variable constant (k) symbolizes PF`s specific effect, which do not diverge over time however vary transversely PFs, the logarithm of the total assets (L), operational age (B) and cover ratio (CR). The variable ( $\varepsilon$ ) it is a residual variable that represents error terms. All the information collected has been treated as annual data. The asterisks are used to denote the statistically significance at 1% (\*\*\*), 5% (\*\*) and 10% (\*) level.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>c</b>	0,42	1,10	0,38	0,70
<b>L</b>	-0,02	0,07	-0,35	0,73
<b>B</b>	0,00	0,02	-0,16	0,87
<b>CR</b>	0,00	0,00	2,14	0,04**
<b>R-Squared</b>	0,06			
<b>Prob (F-statistics)</b>	0,18			

From the observation of Table 6, we found that the only variable that is statistically significant is Cover Ratio, since the probability is 0.04. Cover Ratio is statistically significant at 5% level. The R-Squared of Home Bias in Portuguese PPR PF`s Bond holdings is 0.06, which indicates that the model almost does not explain none of the variability of the response data around its mean, only 6%. F-Statistic, indicates if a group of variables is jointly statistical significant. In this case, the group of variables is jointly significant at 18% (which is good because is near zero). So, the group of variables explain globally the model.

We will recall again the hypothesis that we developed on Sub-Chapter 4.3.1 and then we will check if it is confirmed by the financial theory, or on the opposite, if we reject it. So:

**H<sub>1</sub>:** The bigger pension funds are less likely to demonstrate Home Bias;

**H<sub>2</sub>:** The mature pension funds are less exposed to Home Bias;

**H<sub>3</sub>:** The higher the cover ratio, the less is the pension fund exposed to Home Bias.

We will start by analyzing Hypothesis 1 for the 3 equations:

Table 4 does not sustain Hypothesis 1. So, when Pension Funds are bigger and with more economic scale, it does not verify for Home Bias in Portuguese PPR PF`s asset allocation

that institutional investors offers additional opportunities to vary their asset across markets and thus, decrease their domestic bias. Correspondingly, when we investigate Home Bias, through asset classes, the similar can be assumed for Equity holdings. As represented in Table 5, the Hypothesis 1 does not occur for Equity Holdings. According to Table 6, PF Size also does not affect Portuguese PPR PF domestic bond experience. In this way, we do not prove that Hypothesis 1 is true, and we learn from these 3 regression outcomes that PF size does not affect Portuguese PPR PF domestic experience, meaning that huge PPR PFs trade-off more their local assets and are reducing their holdings of foreign assets. The same is true for bonds and assets separately.

We will now analyze Hypothesis 2 for the 3 equations:

Table 4 does sustain our Hypothesis 2. So, the regression outcomes showed on Table 4 confirm that the experience and the know-how of institutional investors do matter in the worldwide broadening Portuguese PPR PFs. From the analysis of Table 4, we can conclude that experience decreases Home Bias. The consequences are statistically significant ( $p\text{-value} = 0.06$ ) and moreover economically significant. For instance, on average, one supplementary year of experience decreases Home Bias by 4% in a typical Portuguese PPR PF. The outcomes confirm usually that more mature PFs should have a better understanding of portfolio diversification and more portfolio risk awareness once they become close to their payout phase, and, as a consequence, reduced home bias in their strategic asset distributions. Our findings become consistent with the judgments of (Alestalo and Puttonen (2007)) if we use PPR PF age as a substitution for PF maturity. However, when we isolated this investigation in Equity Holdings, as shown in Table 5, and also in Bond Holdings, as shown in Table 6, the experience does not impact Home Bias in Portuguese PPR PF's. So, we confirm that Hypothesis 2, only impacts general assets, but the same is not true when we test separately bonds and equities.

To conclude, we will analyze the Hypothesis 3 for the 3 equations:

Hypothesis 3 is not confirmed by Table 4. Table 4 shows that cover ratio does not affect global asset allocations of Portuguese PPR PFs across markets. The same is verified for the



Equity Holdings, on Table 5. Cover ratio disturbs and affects only Bond market. Table 3 shows that higher cover ratio intensifies the quantity of domestic bond experiences in Portuguese PPR PF's asset distribution, which challenges our original expectations. A higher cover ratio means further accessible assets to cover liabilities. These additional available assets increase the capacity of a PF to tolerate more dangerous by providing a buffer against those risks. We also found a very minor negative correlation concerning PF size and its cover ratio (-0.10), as we can see in Table 3 from Correlation matrix, signifying that small PFs have higher cover ratios. Consequently, we confirm Hypothesis 3 only in the Bond market.

## 6. CONCLUSIONS AND SUGGESTIONS

### 6.1. Summary of Findings

This thesis provides empirical evidences on the asset allocation decisions of PPR PFs in both two markets, i.e., the domestic and the international one. Our data is composed of 14 PPR Portuguese Funds from 2006 to 2014. Through the analysis of this data, it was found that PPR PF's in Portugal contained over 50% of equity and bond assets. Due to this finding, we have focused on stocks (riskier assets) and bonds (assets with less risk) in this dissertation, since the data for both assets is of great detail and easily accessed.

We have determined that Portuguese PPR PFs have slightly reduced their domestic fraction of investments from 5% to 2% on an asset weighing average basis. The modification is much more prominent in less-risky assets and depends on the PPR PF specific characteristics.

The study also provided empirical evidence on how individual characteristics such as size, age and cover ratio of institutional investors, drove their long-term asset allocation. Within the scope of this dissertation, three hypothesis were analysed. The hypothesis 1 asserted that bigger pension funds were less likely to demonstrate Home Bias. The hypothesis 2 stated that the mature pension funds were less exposed to Home Bias and, according to the hypothesis 3 the funds with higher cover ratios had less Home Bias on pension fund.

We concluded that Hypothesis 1 was not verified for Home Bias in Portuguese PPR PFs, thus, it was verified that bigger pension funds with higher economic scale did not offer additional opportunities to vary bonds and equity asset across markets and therefore investors decreased their domestic bias.

On hypothesis 2, we confirmed that the know-how of institutional investors did matter in the worldwide broadening PPR PFs. On average, one additional year of experience decreased Home Bias by 4% in a typical Portuguese PPR PF. So, the outcomes confirmed that more matured PFs should had a better understanding of portfolio diversification and more portfolio

risk awareness if we used PPR PF age as a substitution for PF maturity. However, the same was not true when we tested bonds and equities separately.

Finally, Hypothesis 3 was only found to be true for the bond market. In other words, higher cover ratio intensified the quantity of domestic bond experience in Portuguese PPR PFs. A higher cover ratio means further accessible assets to cover liabilities. These additional available assets increased the capacity of a PF to tolerate more vulnerability by providing a buffer against those risks. A very minor negative correlation concerning PF size and its cover ratio (- 0.10) was found, meaning that small PFs have higher cover ratios.

## **6.2. Main contributions**

The main contributions of this study to the academic world knowledge lay on these aspects:

Firstly, to the best of our knowledge, the study explored a problem that had not been previously researched in Portugal. Prior to the conduction of this dissertation, most of the studies written on this topic were US based. In Europe a limited number of studies on this topic were found. In today's society, Pension Funds and Home Bias topic are becoming popular; however most of the time they are separately studied. Therefore, it was important to have this first study applied for the Portuguese market, in which we provide empirical study explaining home bias by using multi-assets data.

Secondly, this dissertation is expected to provide new information and enhance the explanatory power of the previous studies when individual characteristics of Pension Funds were taken into account. This study was made to investigate whether Portuguese PF's suffer Home Bias and which were the reasons behind that. Thus, the linkage of the Home Bias to the individual characteristics of institutional investors was studied, such as: size, age and cover ratio, as these characteristics might serve as the driving factors of Institutional investors' long-term asset allocation.

Thirdly, our study replicated the peculiar investment behavior of the Portuguese institutional investors as well as European institutional investors, when the main focus is on stocks (riskier assets) and bonds (assets with less risk) in this dissertation.

Lastly, the authors of this study would like to inspire other academic researchers to explore this topic of Home Bias on Pension Funds even further.

### **6.3. Limitations and suggestions for further research**

This dissertation has several limitations. Due to time constraints, only PPR Pension Funds were studied. The sample contains data was only for eight years. Consequently, size, age and cover ratio were examined as determinants of equity home bias. It is recommended, that in further research, other variables which have not been included in the model but could potentially explain equity home bias in pension funds, such as pension plan or familiarity and geographical proximity should be studied. Furthermore, it is recommended to consider other asset categories, besides bonds and assets categories. We also recommend adopting a larger sample period if possible.

## BIBLIOGRAPHY

### **Books**

Smith, Anthony D. (1991), *“National Identity”*, (Harmondsworth, Middlesex: Penguin Books);

Tajfel, Henri and John C. Turner, (Monterey, Canada: Brooks/Cole, 1979), *“An integrative theory of intergroup conflict”* in William G. Austin and Stephen Worchel (eds.) *“The Social Psychology of Intergroup Relations”*, pages: 69-89;

### **Papers**

Alan A., William L. Grier and Francis E. Warnock (2004). *“Information costs and home bias: An analysis of U.S. holdings of foreign equities”*, *Journal of International Economics*, Vol. 62, issue 2, pp. 313-336;

Babilis. S and Fitzgerald V. (2005). *“Risk Appetite, Home Bias and the Unstable Demand for Emerging Market Assets”*, *International Review of Applied Economics*. 19 (4), pp. 459-476;

Barber, B. and T. Odean (2002), *“Online Investors: Do the slow die first?”*, *Review of Financial Studies*. 15(2), pp. 455-487;

Baxter, Marianne and Urban J. Jermann. 1997. *“The international diversification puzzle is worse than you think”*, *American Economic Review* 87, pp. 170-180;

Bekaert G. and Urias M.S. (1996). *“Diversification, Integration and Emerging Market Closed-End Funds”*, *Journal of Finance* (51), 3, pp.835-869;

Benartzi, Shlomo (2001), *“Excessive extrapolation and the allocation of 401(k) accounts to company stock”*, *Journal of Finance*. 56, pp. 1747-1764;

Black, Fischer (1974), *“International capital market equilibrium with investment barriers”*, *Journal of Financial Economics*. 1, pp. 337-352;

- Black, Fischer and Robert Litterman. (1992). “*Global portfolio optimization*”, *Financial analysts Journal* 48 (5), pp. 28-43;
- Brennan, Michael J. and Henry H. Cao (1997), “*International portfolio investment flows*”, *Journal of Finance* 52, pp. 1858-1880;
- Chan, K., Covring, V. and Ng, L. (2009), “*Does home bias affect firm value? Evidence from holdings of mutual funds worldwide*” *Journal of International Economics*, (78), 2, pp. 230-241;
- Chordia, T. (1996), “*The structure of mutual funds charges*”, *Journal of Financial Economics*, Vol. 41, pp. 3-39;
- Cooper, I. and E. Kaplanis, (1994). “*Home Bias in Equity Portfolios, Inflation Hedging and International Capital Market Equilibrium*”, *Review of Financial Studies* 7 (1), pp. 45-60;
- Coval, J.D. and T.J. Moskowitz (1999). “*Home Bias at Home: Local Equity Preference in Domestic Portfolios*”, *Journal of Finance*. 54(6), pp. 2045-2073;
- Covring, V.M., Defond, M.L. and Hung, M. (2007). “*Home Bias, Foreign Mutual Funds Holdings and the Voluntary Adoption of International Accounting Standards*”. *Journal of Accounting Research*, 48, pp. 41-70;
- Daly, K and Xuan, V.V. (2013). “*The determinants of home bias puzzle in equity portfolio investment in Australia*”. *Review of Financial Analysis*, 27, pp. 34-42;
- Davis, E Philip. (2002). “*Pension fund management and international investment – a global perspective.*” *Caribbean Centre for Monetary Studies*, Trinidad;
- De Santiase G. and Bruno G. (1997). “*International Asset Pricing and Portfolio Diversification with Time-varying Risk*”. *Journal of Finance*, vol. 52, pp. 1881-1912;
- Dreu, J. and Bikker, J.A., (2012). “*Investor sophistication and risk taking*”, *Journal of Banking and Finance*, 36, pp. 2145-2156;

- Eldor, Rafael., David Pines and Abba Schwartz. (1988). “*Home asset preference and productivity shocks.*” *Journal of International Economics*, 25, pp. 165-176;
- Errunza V. R. (1977). “*Gains from portfolio diversification into less develop countries securities*”. *Journal of International Business Studies*, Fall-Winter, pp.83-99;
- Errunza, Vihang., and Etienne Losq. (1985). “*International asset pricing and mild segmentation: theory and test.*” *Journal of Finance*, 40, pp. 105-124;
- Fedenia, M, Shafer. S and Skiba, H. (2013). “*Information immobility, industry concentration, and institutional investors` performance*”. *Journal of Banking & Finance*, 37, pp. 2140-2159;
- French, K. and J. Poterba, (1991). “*Investors Diversification and International Equity Markets*”, *American Economic Review*, 81, pp. 222-226;
- Gehrig, Thomas P. (1993), “*Na information based explanation of the domestic bias in international equity investment*”, *Scandinavian Journal of Economics* 95, pp. 97-109;
- Gerke, Wolfgang and Mager, Ferdinand (2005), “*Pension Funding, Insolvency Risk and the Rating of Corporations*”, *Schmalenbach Business Review*, Special Issue 2, 2005;
- Gorman, L.R. &Jorgensen, B.N. (1996). “*Domestic Versus International Portfolio Selections: A Statistical Examination of the Home Bias*”. *Working Paper, Kellogg Graduate School Management, Northwestern University Press*;
- Graham, J. R., C. R. Harvey and H. Huang (2005), “*Investor Competence, Trading Frequency and Home Bias*”, *NBER Working Paper No. W11426*;
- Graham, J. R., C. R. Harvey and H. Huang (2009). “*Investor Competence, Trading Frequency and Home Bias*”. *Management Science*, 55 (7), pp. 1094-1106;
- Grinblatt, M. and M. Keloharju, (2001), “*What Makes Investors Trade?*” *Journal of Finance*. 56(2), pp. 589-616;

- Grubel, Herbert G. 1968. "Internationally diversified portfolios" *American Economic Review* 58: 1299-1314;
- Holzmann, Robert. "The World Bank approach to pension reform", *International Social Security Review*, vol.53, No.1, January 2000, pp. 11-34;
- Hopkins, Nick and Neil Murdoch, (1999), "The role of the "other" in national identity: Exploring the context-dependence of the national ingroup stereotype", *Journal of Community and Applied Social Psychology* 9, pp. 321-338;
- Huberman, G. (2001), "Familiarity breeds Investment", *Review of Financial Studies* 14, pp. 659-680;
- Huberman, G. and P. Sengmuller, (2004), "Performance and Employer Stock in 401(k) Plans", *Review of Finance*. 8(3), pp. 403-443;
- Jeske, Kartsen (2001), "Equity home bias: Can information cost explain the puzzle?" *Federal Reserve Bank of Atlanta Economic Review* 3, pp. 31-42;
- Kang, Jun-Koo and René M. Stulz (1997), "Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan", *Journal of Financial Economics* 46, pp. 3-28;
- Kilka, Michael and Martin Weber (2000), "Home Bias in international stock return expectations", *Journal of Financial Economics* 96, pp. 3-28;
- Levy, H. and M. Sarnat. (1970). "International Diversification of Investment Portfolios", *American Economic Review* 37, pp. 571-608;
- Lewis, K., (1999). "Trying to explain home bias in equities and consumption." *Journal of Economic Literature*. 37 (2), pp. 571-608;
- Li, Y. Gao, R. Du, R & Huang, S. (2007). *The Research of Chinese Home Bias. International Conference on Management Science & Engineering*, 14, pp.20-22;
- Low, Aaron (1993), "Essays on Asymmetric Information in International Finance, Ph.D. thesis, University of California at Los Angeles, Anderson School of Management;



- Mann, Catherine L., and Ellen E. Meade. (2002). *"Home Bias, Transaction Costs, and Prospects for the Euro: a more detailed analysis."* CEP Discussion Paper 0537, Centre for Economic Performance, LSE;
- Merton R. (1987). *"An equilibrium Market Model with Incomplete Information"*. *Journal of Finance*, Vol. 42, n°3, pp. 483-510;
- Obstfeld, Maurice and Kenneth Rogoff (2000). *"The six Major puzzles in International Macroeconomics: Is there a common Cause?"* NBER Macroeconomics Annual 15;
- Rubbaniy, G.; Leyveld, I. P. P. and Verschoor, W. F. C. (2010), *"Home Bias and Dutch Pension Funds' Investment Behaviour"*, 23 rd Australasian Finance and Banking Conference 2010 Paper;
- Solnick, Bruno H. (1995). *"Why not diversify internationally rather than domestically?"* *Financial Analysts Journal*: pp. 89-94;
- Solnick, B. (1974). *An equilibrium model of the international capital market*. *Journal of Economic Theory*, 8, pp. 500-524;
- Stockman, Alan C. and Harris Dellas, 1989. *"International portfolio non-diversification and exchange rate variability."* *Journal of International Economics* 26: pp. 271-290;
- Strong, N. and X. Xu (2003), *"Understanding the Equity Home Bias: Evidence from Survey Data"*, *Review of Economics and Statistics* 85(2), pp. 307-312;
- Stulz R. (1981). *"On the effect of barriers to international investment"*. *Journal of Finance*, Vol. 36, pp. 923-934;
- Tesar L. and Werner I. (1995). *"Home Bias and High Turnover"*. *Journal of International Money and Finance*, vol. 14 (4), pp. 467-492;
- Vissing-Jorgensen. A. (2003), *"Perspectives on Behavioural Finance: Does "Irrationality" Dissapear with Wealth? Evidence from Expectations and Action"*, NBER Macroeconomics Annual;

Wheatley, simon M. (2001). *“Keeping up with Joneses, human capital, and the home-equity biases.” University of Melbourne: working paper*

### **Website**

Associação Portuguesa de Fundos de Investimento, Pensões e Patrimónios, available on: <<http://www.apfipp.pt/>> Consulted on 02 March 2015;

Autoridade de Supervisão de Seguros e Fundos de Pensões, available on: <<http://www.asf.com.pt/>> Consulted on 05 March 2015;

Comissão de Mercado de Valores, “Relatório de Contas” (2008-2014), available on: <<http://www.cmvm.pt/pt/Pages/home.aspx>> Consulted on 23 April 2015;

European Commission, available on: <<http://ec.europa.eu/eurostat/>> Consulted on 10 March 2015;

Organization for Economic Co-operation and Development (OECD) (2014) “Pension Markets in Focus” available on: <<http://www.oecd.org/daf/fin/private-pensions/Pension-Markets-in-Focus-2014.pdf>> Consulted on 05 March 2015;

Statistics Portugal, available on: <<http://www.ine.pt/>> Consulted on 05 March 2015;